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OF
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I had this evening intended to take up especially the relationship of tuberculosis in the domestic animals to tuberculosis in man, but after Dr. McEachran's masterly paper I think that you, Mr. President, and all here present, will agree that such would be a work of supererogation, for in so doing I could but follow along similar lines, employ similar illustrations, and arrive at like conclusions to his. And when it is remembered that Dr. McEachran has made this subject particularly his own, that he was one of the pioneers in calling attention to the infectious nature of bovine tuberculosis, having published very conclusive evidence to this end so long ago as 1870, and that through his representations the Dominion led the civilized world by two years in scheduling tubercular cattle, I think that after his paper any disquisition from me upon this aspect of tuberculosis is unnecessary, although there are one or two details upon which later I should like to dwell for a moment.

I will therefore take up another and important aspect, namely, the infectiousness of tuberculosis as between man and man. Of this, after long years of discussion, there can now be no discussion; but it is well worth our while to call to mind the main researches upon which our knowledge of this infectiousness is based. From the fact that in the adult the most common seat of the tubercular infection is the lung tissue (indeed, as Dr. Harris, of Manchester, and others have pointed out, careful examination shows the presence of active or obsolescent tuberculosis in the lungs of from 30 to over 50 per cent. of all bodies examined in the post-mortem room of the hospitals of large cities), it is evident that the disease in the adult is most easily acquired through the respiratory tract. How, then, do the bacilli come into the inhaled air? Are they ubiquitous, do they multiply outside the body, or are they always acquired from animals or human beings suffering from the disease? Certainly they are not ubiquitous; the experiments of Cornet, to which I shall refer more fully in a few minutes, prove conclu-

sively that from the dust of rooms that have not been inhabited by phthisical patients no bacilli can be obtained—that is to say, guinea-pigs inoculated with this dust never succumbed to tuberculosis. Again, the bacilli can only grow at the blood temperature ; evidently, therefore, they cannot multiply under ordinary conditions outside the body. But on the other hand they are endowed with great vitality. They withstand maceration and putrefaction for several days, as demonstrated by Galtier, and, as shown by Baumgarten, Ransome and others, dried phthisical sputum can be kept for half a year or more without the contained bacilli losing their virulence. The presence of the bacilli in the dust deposited from the air in rooms occupied by phthisical patients was determined so long ago as 1883 by Dr. Theodore Williams at the Brompton Hospital. Dr. Cornet, while confirming these last results throws doubt upon them. However, Cornet's own observations were so admirable and so extensive that even if forestalled by Dr. Williams he is worthy of all credit as having established most fully the point in question. In place of filtration or collection directly from the air, he removed the dust that had deposited upon the wall immediately above the head of the phthisical patient's bed, and inoculating this dust, suspended in broth into the abdominal cavities of three guinea-pigs, in each case he obtained very remarkable results. Many of the animals died rapidly, as might be expected, of septic peritonitis, but he obtained a large number of cases in which one or more of the guinea-pigs succumbed to tuberculosis. Thus 38 separate examinations in 7 different hospitals led in 15 cases to positive results, while the dust collected from the neighbourhood of 62 private tubercular patients induced tuberculosis 21 times in one or more of the inoculated animals. When it is taken into account that everything points to the fact that several bacilli must be inoculated in order to induce the disease, solitary bacilli being destroyed by the organism, then these results become most significant.

But Cornet did more than this. If, as these results demonstrate, the immediate neighbourhood of phthisical patients is rich in tubercle bacilli, then that neighbourhood must be especially infectious. Can this be proved to be the case? Very many

individual cases have been adduced in which the husband of the tubercular wife has become tubercular, and *vice versa*; but statistics are still wanting of the extent to which this obtains, and those statistics are difficult to obtain. There is another class that can be held peculiarly liable, namely, sick nurses—not so much those attending individual cases as those attending upon the sick in hospital wards, where necessarily, owing to the large proportion that phthisical cases bear to all other cases, each nurse must be brought into intimate contact with a series of tubercular patients. The vital statistics of this class of the community can be more easily collected and studied. It was to this study that Cornet applied himself and this is what he found:—

In Germany the sick in hospital are largely attended by religious sisterhoods and confraternities. Taking thirty-eight of these nursing corporations he found that, during the last 25 years, of their total mortality 62.8 per cent., or almost two-thirds, was recorded as being from tuberculosis, while of those members of the corporations dying between the ages of twenty-five and thirty-five no less than 73 per cent. had succumbed to this disease, in place of a little over 40 per cent. in the general population. Or, to put the matter in another light, a German nurse, member of one of these sisterhoods, *has at twenty-five the same expectation of life as a woman at fifty-eight in the general population*. This is a terrible revelation. Little wonder that now-a-days in Germany the lesson thus given as to the infectious nature of tuberculosis has been taken well to heart and that every precaution, even down to the disinfection of railway carriages, is being carried out by the government and by civic bodies.

If, as Ransome has proved, the breath of a phthisical patient contains the bacilli, *a fortiori* are the bacilli present in large quantities in the sputum, and it is this sputum that must be rigorously disinfected. Not only must this be collected in special utensils and then disinfected and the utensils rendered sterile by boiling daily (or, as some advise, be made of such materials that they can only be employed one day and then be

cast into the fire), but the handkerchiefs and bed linen must be washed apart and well disinfected, the habit of promiscuous expectoration must be stopped sternly, and when a patient has died or has left a room then the walls and floor of that room must undergo thorough disinfection.

All these precautions are absolutely necessary, and it is our duty to publish them widely abroad, if the spread of tuberculosis is to be averted. This, of course, is but one side of the question; there is still the undoubted spread of the disease through the intermediation of animals that Dr. McEachran has so well placed before us, through food, that is, where the bacilli gain their entry through the alimentary tract.

Intestinal and abdominal tuberculosis is most common, as we all know, in the young, and the prevalence of milk diet indicates what Bang in Denmark, Bollinger in Germany, Nocard in France, and Woodhead and MacFadyean in England have conclusively proved to be the case, that this intestinal tuberculosis is very largely brought about by the milk of tubercular cows. The milk, in fact, is far more infectious than the flesh of these animals. It is only in advanced tubercular disease that the bacilli are to be found in the musculature, the flesh of animals. On this account one might be inclined to say that in this country, where the habit of eating raw flesh is scarce, if at all practised, the flesh of animals exhibiting the lesser degrees of tuberculosis might safely be permitted to be sold in public market. Nevertheless, half measures are here no measures—if the disease is to be stamped out we must be drastic, and for this reason I would urge that all animals discovered to be tubercular be condemned *in toto*. We are here dealing with humanity's most terrible scourge, with the disease to which is ascribable nearly a quarter of all the deaths from all causes at all periods of life, far more deaths than from any other single cause. It is our duty, gentlemen, to use our every endeavour in spreading abroad a knowledge of the danger of tubercular infection and in inculcating sound means of prevention. It is our duty to give our individual and united support to every measure which tends to lessen its spread, whether in man or in the domestic animals.

